

Claims

1. An amino acid composition suitable for hemodialysis, comprising amino acids in the following proportions:

Amino Acid	wt%	wt%
	Lower Limit	Upper Limit
Gln	14.0	23.0
Ala	7.0	12.0
Pro	6.0	10.5
Val	5.0	9.5
Gly	3.5	6.0
Lys	6.5	11.0
Leu	3.5	6.0
Thr	3.0	5.5
Ser	2.0	4.0
Arg	4.0	6.5
His	2.5	5.0
Ile	1.5	3.0
Tyr	2.0	3.8
Orn	2.2	4.5
Glu	1.5	3.5
Phe	2.0	3.5
Cys	1.8	3.5
Asn	1.1	2.2
Trp	1.3	2.8
Cit	1.0	2.0
Met	0.5	1.2
Abu	0	0.5
Asp	0.4	1.0

2. The amino acid composition of Claim 1, which comprises the amino acids in the following proportions:

Amino Acid	wt%	wt%
	Lower Limit	Upper Limit
Gin	14.5	21.9
Ala	7.3	11.1
Pro	6.6	10.0
Val	5.9	8.9
Gly	3.8	5.8
Lys	6.9	10.4
Leu	3.6	5.5
Thr	3.3	5.1
Ser	2.3	3.5
Arg	4.1	6.3
His	2.7	4.2
Ile	1.8	2.8
Tyr	2.2	3.4
Orn	2.8	4.4
Glu	2.0	3.1
Phe	2.1	3.2
Cys	2.0	3.1
Asn	1.3	2.1
Trp	1.5	2.4
Cit	1.1	1.8
Met	0.6	1.0
Abu	0.01	0.01
Asp	0.5	0.9

3. A dialyzer fluid suitable for hemodialysis, comprising the amino acid composition of Claim 1.

4. A dialyzer fluid suitable for hemodialysis, comprising the amino acid composition of Claim 2.

5. The dialyzer fluid of Claim 3, which is in the form of an aqueous solution.

6. The dialyzer fluid of Claim 4, which is in the form of an aqueous solution.

7. The dialyzer fluid of Claim 3, wherein the amino acids have the following concentrations:

Amino Acid	Concentration ( $\mu\text{mol/l}$ )	Amino Acid	Concentration ( $\mu\text{mol/l}$ )	Amino Acid	Concentration ( $\mu\text{mol/l}$ )
Gln	320.0-670.0	Thr	90.0-170.0	Glu	35.0-90.0
Ala	250.0-575.0	Ser	70.0-140.0	Phe	40.0-80.0
Pro	170.0-400.0	Arg	60.0-135.0	Cys	25.0-75.0
Val	160.0-330.0	His	50.0-120.0	Asn	22.0-64.0
Gly	150.0-310.0	Ile	45.0-100.0	Trp	15.0-60.0
Lys	120.0-240.0	Tyr	50.0-95.0	Cit	18.0-45.0
Leu	85.0-185.0	Orn	50.0-90.0	Met	12.0-35.0
Abu	0-35.0	Asp	12.0-24.0		

8. The dialyzer fluid of Claim 3, wherein the amino acids have the following concentrations:

Amino Acid	Concentration ( $\mu\text{mol/l}$ )	Amino Acid	Concentration ( $\mu\text{mol/l}$ )	Amino Acid	Concentration ( $\mu\text{mol/l}$ )
Gln	332.08-498.12	Thr	94.47-141.71	Glu	45.67-68.51
Ala	275.38-413.07	Ser	73.08-109.62	Phe	42.62-63.93
Pro	191.78-287.67	Arg	65.82-98.74	Cys	27.97-41.95
Val	168.45-252.67	His	59.81-89.71	Asn	29.84-44.76
Gly	170.51-255.76	Ile	47.16-70.74	Trp	25.59-38.39
Lys	126.14-189.21	Tyr	40.62-60.93	Cit	22.53-33.79
Leu	91.88-137.83	Orn	56.93-85.40	Met	13.58-20.37
Abu	0.26-0.39	Asp	13.62-20.44		

9. A method of preparing the dialyzer fluid of Claim 3, comprising incorporating the amino acids into a fluid medium.

10. A method of hemodialysis, comprising dialyzing a patient in need thereof with the amino acid composition of Claim 1.

11. A method of hemodialysis, comprising dialyzing a patient in need thereof with the dialyzer fluid of Claim 3.

12. A method of hemodialysis, comprising dialyzing a patient in need thereof with the dialyzer fluid of Claim 4.

20 13. An apparatus for hemodialysis with a dialyzer, comprising:  
 a first flow path for the blood of a patient,  
 a second flow path for a dialyzer fluid,  
 a semipermeable membrane separating the first and second flow paths,  
 a vessel for containing the dialyzer fluid, wherein the vessel has a connection for  
 25 withdrawal of dialyzer fluid to be supplied by the dialyzer and has a connection for the return  
 to the vessel of the dialyzer fluid arriving from the dialyzer,

wherein the vessel is sufficiently thermally insulated from the ambient air that there is no need for a heating means to control the temperature of the dialyzer fluid and to keep it constant throughout the duration of the dialysis treatment,

5 wherein the connection for withdrawal of the dialyzer fluid discharges at the upper region of the vessel and the connection for return of the dialyzer fluid discharges in the lower region of the vessel,

wherein the vessel contains a dialyzer fluid containing the amino acid composition of  
Claim 1.

10 14. The apparatus of Claim 13, wherein the vessel has double walls and the space between the inner vessel and a surrounding additional jacket is sealed from the ambient air.

15 15. The apparatus of Claim 14, wherein the inner vessel and the jacket are made of transparent materials having low thermal conductivity compared with metals.

16. The apparatus of Claim 14, wherein a radiant heating element is disposed under the inner vessel.

15 17. The apparatus of Claim 13, wherein the vessel is capable of housing a UV irradiation source.

18. The apparatus of Claim 13, wherein the connection for return of the dialyzer fluid discharges at the upper part of the vessel into a tube, which is disposed in the interior of the vessel and the end of which is open close to the vessel bottom.

20 19. The apparatus of Claim 18, wherein the tube is axially disposed, and at its bottom end is provided with a closed inner tube for housing a UV irradiation source.

20. The apparatus of Claim 13, wherein the vessel is in communication via an overflow with a measuring instrument for recording any excess fluid volume produced.

21. The apparatus of Claim 13, wherein a flow resistance for adjustment of the ultrafiltration speed is provided in the return line of the first flow path of the dialyzer.
22. The apparatus of Claim 13, wherein a device for generating a positive backpressure is provided in the second flow path of the dialyzer.
- 5           23. The apparatus of Claim 13, wherein a measurement and control instrument measures the excess fluid volume produced, compares the measured value with a specified value and, on the basis of the result of the comparison, automatically adjusts the flow resistance in the return line of the first flow path or the positive backpressure in the second flow path of the dialyzer such that the deviation between measured value and specified value  
10          is minimized.